ATXI Exhibit 12.0 (Rev.)

ILLINOIS COMMERCE COMMISSION

DOCKET NO. 12-0598

REVISED REBUTTAL TESTIMONY

OF

JEFFREY V. HACKMAN, P.E.

Submitted On Behalf

Of

AMEREN TRANSMISSION COMPANY OF ILLINOIS

May 8, 2013

TABLE OF CONTENTS

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I. INTRODUCTION AND WITNESS QUALIFICATIONS

Q. Please state your name, business address and present position.

A. My name is Jeffrey V. Hackman. My present position is Director of Transmission Operations for Ameren Services Company ("AMS"), located at 1901 Chouteau Avenue, St. Louis, Missouri 63166.

Q. Are you the same Jeffrey V. Hackman who sponsored direct testimony in this proceeding?

A. Yes, I am.

II. PURPOSE AND SCOPE

Q. What is the purpose of your rebuttal testimony?

A. The purpose of my rebuttal testimony is to respond to testimony filed by witnesses on behalf of the Illinois Commerce Commission's ("Commission") Staff and certain intervening parties in this proceeding relating to the construction and operation of the 345 kV transmission line and related facilities comprising the Illinois Rivers Project (the "Project"). I find it necessary to respond up front to what has emerged as a recurring theme in Staff and Intervener

witnesses' testimony—the suggestion the Project should utilize existing transmission line "rights-of-way" wherever possible. I believe some clarification is warranted here. Next, I respond to the testimony of Staff witness, Mr. Greg Rockrohr as it relates to construction and operation of the Project. For the sake of efficiency, I then respond to what I see as several other recurring themes in the testimony filed on behalf of intervening parties—(1) concern regarding the proposed transmission line's electromagnetic field ("EMF"); (2) concern regarding stray voltage; (3) concern regarding the Project's proximity to limestone mining operations; (4) concern regarding the Project's construction schedule; and (5) concern regarding the impact of ongoing maintenance and repair of the Project facilities once constructed. Finally, I respond to party-specific concerns relating to construction and operation of the Project raised in the testimony of witnesses on behalf of intervening parties Stop the Power Lines Coalition ("STPL"), JDL Broadcasting, Inc. ("JDL"), the Ragheb Family, and N. Kohl Grocer Company ("N. Kohl Grocer"). That I do not address a particular witness's testimony, however, does not mean I endorse it.

Q. Are you sponsoring any exhibits with your rebuttal testimony?

A. Yes. I am sponsoring ATXI Exhibit 12.1, which is a collection of Staff and Intervener data request responses that I reference in my testimony.

III. THE USE OF EXISTING TRANSMISSION LINE RIGHTS-OF-WAY

Q. You stated the suggested use of existing transmission line rights-of-way is a recurring theme in Staff and Intervener witnesses' direct testimony. Please explain.

A. Several Intervener witnesses suggest Ameren Transmission Company of Illinois ("ATXI") should utilize for the Project, wherever possible, the rights-of-way of existing

transmission lines, and, specifically, Ameren Illinois Company d/b/a Ameren Illinois ("AIC") transmission lines. (*See, e.g.*, Pedersen Dir. (Adams County Property Owners ("ACPO")), p. 4, ll. 1-3; Flesner Dir. (ACPO), ll. 59-60; Loos Dir. (ACPO), ll. 81-82; Miller Dir. (ACPO), ll. 95-96; Mast Dir. (ACPO), ll. 93-94; Peters Dir. (ACPO); ll. 116-20; MSSCLPG Exs. 1.0 (Bergschneider Dir.), ll. 132-35 and 4.0 (Bergschneider Reb.), ll. 39-41; Wiese Dir. ("Weise Farms"), Ex. 1, Q. 4; Ragheb Family Ex. 1.0 (Ragheb Dir.), ll. 87-89; Pearce Dir., p. 4; Ehrhart Dir. (N. Kohl Grocer), p. 12, ll. 15-21.) Mr. Rockrohr also suggests the use of existing AIC transmission lines rights-of-way would be appropriate for certain portions of the Project. (*See, e.g.*, ICC Staff Ex. 1.0R (Rockrohr Dir.), ll. 512-17.) Because so many witnesses in this proceeding recommend the use of existing transmission line rights-of-way wherever possible for the Project, I find it necessary to respond up front to their collective suggestion.

Q. Why do you believe clarification regarding the use of existing transmission line rights-of-way is warranted?

A. There are two reasons. First, it is not clear to me, in suggesting ATXI use existing AIC transmission line rights-of-way, that Interveners anticipate precisely where the 345 kV transmission line proposed in this proceeding will be in relation to those existing transmission lines. Second, a number of Interveners suggest it would be appropriate for ATXI to "dual circuit," "upgrade," or "repower" existing AIC transmission lines for certain portions of the Project. (*See, e.g.*, Pearce Dir., p. 4; Ragheb Family Ex. 1.0, ll. 125, 271-74; Ehrhart Dir. (NKG), p. 12, l. 23, p. 14, ll. 7-8.) This leads me to believe there may be some confusion regarding the distinction between "paralleling" transmission lines and "dual circuiting" or "double circuiting" them. Accordingly, I believe it is necessary to clarify that distinction, and to

explain why neither option is always desirable from a transmission line construction and operations perspective.

A. "Paralleling" Transmission Lines

Q. Please explain what it means to "parallel" transmission lines.

A. To "parallel" transmission lines means to locate them on parallel rights-of-way. In other words, separate structures support each circuit. For the Project, this would mean existing AIC structures would remain, and new structures for the Project would be constructed independently, parallel to the existing AIC structures.

Q. Do parallel transmission lines require less rights-of-way?

A. Not necessarily. There are three basic variations of the rights-of-way used for parallel transmission lines: (1) overlapping rights-of-way, (2) adjoining rights-of-way, and (3) offset rights-of-way.

In the case of overlapping rights-of-way, a utility tries to use some of an existing right-of-way for the purposes of the new line. For instance, if the utility had an existing 100-foot right-of-way, and both new and old lines had a nominal 100-foot right-of-way requirement, the utility might consider if 10 feet of the existing right-of-way could be used for both lines, thus requiring an additional easement of only 90 feet. This is most common when an existing right-of-way is wider than nominal. However, for the case I described, the movement of the wires must accommodate the reduced spacing. Additionally, there is usually a dramatic reliability reduction in that the structures are very close and constitute a real and immediate threat to each other. Also, local weather events and wind-blown debris or objects are likely to cause faults on both lines.

In the case of adjoining rights-of-way, the utility would abut the new right-of-way to the existing right-of-way without separation. Thus, in my example, the old line right-of-way of 100 feet would abut the new 100-foot right-of-way for the new circuit, resulting in an unbroken 200-foot wide utility easement. As with overlapping rights-of-way, the proximity of the circuits' structures to each other and the likelihood of local weather and wind-blown debris and other objects is still a concern.

In the case of offset rights-of-way, the lines parallel each other, but the rights-of-way do not touch. In other words, there is some width of land between the two easements. This separation increases the reliability.

Q. Does paralleling transmission lines reduce the cost of constructing new lines?

A. Practically, no. In the case of overlapping rights-of-way, there is a slight reduction in the amount of right-of-way that must be purchased. However, there are not any existing rights-of-way with extra width for consideration for this Project (other than on the Sidney to Rising portion, which the Commission addressed in its Order in Docket No. 12-0080). Regardless, as mentioned, the movement of the conductors often limits the practical application of using overlapping rights-of-way.

Q. Does paralleling transmission lines reduce the costs associated with their ongoing maintenance and repair?

A. No. The practical reality is that, if the circuits are close to each other, both circuits may have to be taken out of service in order to do maintenance. Then overtime charges must be incurred and/or specialized equipment must be brought in because the time to repair a line must be kept to an absolute minimum.

Q. Why is paralleling undesirable from a construction and operations standpoint?

A. Apart from the potential for increased cost, it is undesirable to construct parallel transmission lines because, unless there is sufficient separation between the lines, during construction of the second line, the first must be taken out of service. Paralleling is undesirable from an operations perspective for the similar reason that, while maintenance is being performed on one line, the other may need to be taken out of service so that large equipment can access the area. Having two lines down at any given point risks the reliability of the transmission system at large. Moreover, from a reliability perspective, common or adjoining rights-of-way are susceptible to common-mode failures. In other words, it increases the probability that, if one line fails, it will cause the adjacent line to fail. Likewise, weather events, either directly or from debris, can cause both lines to fail. For these reasons, paralleling existing transmission lines generally is not preferred.

Q. Have you reviewed the Direct Testimony of ACPO witness, Ms. Karen S. Pedersen, P.E. in this proceeding?

A. Yes. Ms. Pedersen states she is a licensed engineer in three states, including Illinois, with industry experience planning electric system improvement projects similar to the Project. (Pedersen Dir. (ACPO), p. 2, ll. 1-18.) Her testimony addresses generally whether it is appropriate to plan and construct parallel transmission lines.

Q. Ms. Pedersen recognizes, "[c]onstructing two transmission lines on the same right-of-way has reliability concerns." (Pedersen Dir. (ACPO), p. 4, ll. 21-22.) But she contends utilities minimize those concerns you discussed by replacing aging poles before they fail. (*Id.*, p. 5, ll. 1-2.) Do you agree?

A. I agree that structure failure is a problem with paralleled circuits that are proximate. But age is only a small subset of the risk to structure integrity. The most telling statement from Ms. Pedersen is that she acknowledges "[c]onstructing two transmission lines on the same right-of-way has reliability concerns." Ms. Pedersen is correct that common-mode failures like wind events, wind borne debris, and structures from one circuit can be reliability hazards for the other circuit.

Q. You stated common or adjoining rights-of-way are susceptible to common-mode failures. What is a "common-mode failure"?

A. A common-mode failure is a failure which is a result of one or more events, which cause coincident failures in two or more systems (in this case, transmission lines) leading to failures in the multiple systems (lines). The event(s) responsible for the common-mode failure can be either internal or external to the systems (lines) that are affected. Using practical examples, if a structure of circuit #1 collapses due to a defect or an external event, and it falls on the wires or structures of circuit #2, that is a common-mode failure. Likewise, if a wind event blows limbs, or other debris, into the adjoining wires of both circuits #1 and #2, that is a common-mode failure.

Q. Mr. Rockrohr believes common-mode failures are normally considered for transmission lines that are constructed on common structures. (ICC Staff Ex. 1.0R, ll. 553-54.) Do you agree?

A. Yes and no. When a new circuit is first planned in order to meet some need (reliability, power transfer, new customer supply), it is my experience that the new circuit performance is generally not studied with existing circuits as though it would be susceptible to common-mode failure. Rather, it is assumed to be an independent supply. Once it becomes known that a new circuit is likely to, or will be constructed such that common-mode failure should be considered, then it would be studied as such. AMS considers whether paralleled rights-of-way, or double circuit, which I discuss below, are appropriate as it goes through the routing process for new lines. That is why existing rights-of-way are listed as a routing opportunity for the Project. However, the nature of the circuits, i.e., their intended purpose, determines whether that is appropriate. Let me describe further. If two circuits are supposed to supply a community, (either directly or as supplies to a substation that serves multiple communities), putting both together on the same structure or the same right-of-way means that when a common-mode failure occurs, the community is without electric supply. On the other hand, if one of the circuits carries generation to a load center ("generation outlet") and the other circuit is for local area reliability (and the area has another source from an independent path), system performance may be acceptable with both circuits subject to common-mode failure. Additionally, geography can affect the decision to parallel transmission lines either because restoration times would be unacceptably long (in the case of river crossings) or because the outage risk is increased by soil, terrain, wind patterns, and the like.

Q. Has AMS constructed parallel transmission lines in Illinois in the past?

A. Yes. And, in fact, in limited instances, ATXI has proposed parallel transmission lines as part of this Project. For example, ATXI proposes 1.3 miles of parallel lines for the Quincy to Meredosia portion of the Project. This clearly shows that ATXI has considered the option as Ms. Pedersen opines should be the case. (Pedersen Dir. (ACPO), p. 4, ll. 1-3.) But the fact that ATXI has proposed paralleling in appropriate circumstances does not mean than every paralleling opportunity should be used. As Ms. Pedersen recognizes, whether to place the 345 kV transmission line in parallel with an existing 138 kV transmission line should be "based on reliability, cost of construction, cost of reinforcements required, impact on the environment and its improvement to system performance." (*Id*., p. 4, ll. 3-5.) Here, ATXI proposed routes that best serve the needs of energy customers and the overall transmission system. I would also point out, although Ms. Pedersen contends ATXI should have made this determination, she does not identify "the 138 kV transmission line" to which she refers in her testimony. It appears, therefore, that she has not weighed those considerations as it relates to the Project.

Q. Mr. Rockrohr asks whether there are any specific NERC reliability rules that specifically require contingency analyses for transmission lines that occupy parallel, but separate and non-overlapping rights-of-way. (ICC Staff Ex. 1.0R, ll. 560-63.) Are there?

A. Yes. NERC "Standard TPL-003-2b — System Performance Following Loss of Two or More BES Elements" and NERC "Standard TPL-004-2a — System Performance Following Extreme BES Events" would apply. The loss of transmission lines that occupy parallel, but separate and non-overlapping rights-of-way would be considered a NERC Category C3 event per Table 1 of the NERC Planning standards. The loss of all transmission lines on a common right-

of-way would be considered a NERC Category D7 event per Table 1 of the NERC Planning standards. Irrespective of these requirements, however, there are benefits to maintaining greater separation between lines, as I have discussed.

Q. What do you conclude about paralleling transmission lines as it relates to the Project?

A. Since the Project provides local area reliability benefits, and the existing AIC circuits were generally built for local area reliability, paralleling should only be used in very limited circumstances in order to mitigate risks of common-mode failures that could lead to outages for customers.

B. "Double Circuiting" Transmission Lines

Q. Please explain what it means to "double circuit" or "dual circuit" a transmission line.

A. Double circuit is the term used to describe the situation where two or more circuits are installed on the same structure(s).

Q. Is double circuiting transmission lines desirable from a construction and operations standpoint?

A. No. To double circuit a new transmission line with an existing one, the old line must be removed from service, new larger structures must be installed, and both circuits constructed. As recognized by Intervener MCPO witness, Mr. James R. Dauphinais, this type of construction decreases reliability, as evidenced by the change in the type of NERC TPL Standard classification. (ATXI Ex. 12.1, p. 22 (ATXI-MCPO 4.15).) Two circuits on a common structure

would decrease the reliability benefits that the Project can offer. If two lines are built on common structures, a single pole failure would create an outage for both lines. This is why common-mode failures, resulting from an event on the structure or related hardware, are mitigated or eliminated by using separate structures. Additionally double circuiting poses operational and maintenance challenges. For normal maintenance issues on common structures, for safety concerns, outages may be required for both lines even if only one line requires maintenance.

Q. Does double circuiting reduce the cost of constructing new transmission lines?

A. No, in the case of adding a new transmission line to a route where there is an existing line, the cost to remove the existing circuit, construct much larger foundations, build taller and larger structures to accommodate both circuits, and string new wire for both circuits would be more expensive than simply building the new line.

Q. Are you familiar with Intervener testimony suggesting ATXI should "upgrade" or "repower" existing transmission lines?

A. Yes. A number of Intervener witnesses suggest ATXI should "upgrade" or "repower" existing 138 kV lines to higher voltage lines, and should replace aging wood poles. (*See, e.g.*, Pearce Dir., pp. 5, 7; Ehrhart Dir. (N. Kohl Grocer), p. 12, ll. 21-23, p.13, ll. 1-3; Ragheb Family Ex. 1.0., ll. 125-26, 269.)

Q. How is "double circuiting" an existing transmission line different from "upgrading" or "repowering" it?

A. Double circuiting is a physical condition. The number and nature of the circuits is the same, it merely relates to what structures support those circuits. For example, an existing AIC circuit is operating at 138 kV. This Project will add an additional transmission circuit, operating at 345 kV. Thus, there will be two circuits. And if they are double circuited, those two circuits will be on the same structure. Contrast that with the situations as described by the Intervener witnesses, wherein "repowering" or "upgrading" relate to changing the number and nature of the circuits. The Interveners suggesting removing the existing 138 kV circuit from operation and rebuilding/replacing the structures and/or conductors that used to support operation at 138 kV with those that would allow the circuit to operate at 345 kV, only. After completion there would only be one 345 kV circuit. As described by ATXI witness, Mr. Dennis D. Kramer (ATXI Ex. 11.0), the planning for the MVP projects identified what should be constructed, which in this case was the addition of the 345 kV Project, keeping all existing transmission circuits.

Q. Did ATXI consider the option of double circuiting existing transmission lines in the planning and routing phases of the Project?

A. Yes. AMS, on behalf of ATXI, explored all options, including double circuiting existing structures. For the reasons discussed above, however, AMS ultimately determined double circuiting existing transmission lines was appropriate only in limited locations.

Q. Has AMS double circuited transmission lines in Illinois in the past?

A. Yes. And, in fact, in limited instances, as stated, ATXI has proposed double circuiting part of the Project when the reliability impacts can be accommodated and the design factors

support it as an economical decision. For example, as explained by ATXI witness, Mr. Jerry A. Murbarger (ATXI Ex. 7.0, ll. 146-53) and noted above, ATXI is proposing to design 3 miles of the Sidney to Rising portion of the Project for joint utilization, with AIC, of double circuit structures in accordance with the Commission's Order in Docket 12-0080.

Q. What do you conclude about the use of double circuiting as it relates to the Project?

A. Double circuiting is an option to consider in the overall system design of the transmission system. The analysis of the options needs to consider all the factors, including reliability, cost, maintenance, and operations. In the case of the Project, double circuiting should only be used in very limited circumstances.

IV. RESPONSE TO STAFF WITNESS, MR. ROCKROHR

Q. Have you reviewed the direct testimony of Mr. Rockrohr (ICC Staff Ex. 1.0R)?

A. Yes. Mr. Rockrohr discusses the benefits of the Project. He also opines whether ATXI's filing satisfies the requirements of Section 8-406.1 of the Illinois Public Utilities Act ("Act"). Finally, he analyzes, for each portion of the Project, the associated substation site proposed by ATXI, the Primary and Alternate Routes for the transmission line proposed by ATXI, and the alternative routes for the line proposed by various intervening parties. Ultimately, he concludes the Commission should grant ATXI a certificate of public convenience and necessity ("CPCN"), albeit one governing facilities and routes to some extent different than those ATXI has proposed. I respond to Mr. Rockrohr's direct testimony from construction and operational perspectives. Other ATXI witnesses respond to Mr. Rockrohr's testimony in other respects.

A. Benefits of the Project

Q. Does Mr. Rockrohr recognize the myriad benefits of the Project?

A. Yes. He acknowledges the economic, reliability, and operational benefits of the Project. (ICC Staff Ex. 1.0R, ll. 247-77; ATXI Ex. 12.1, pp. 3-4 (ATXI-ICC 2.08, 2.09).)

Q. Does Mr. Rockrohr dispute any of the benefits of the Project?

A. No. He does, however, question whether many of the Project's benefits will be realized absent AIC connecting its existing 138 kV transmission system to ATXI's proposed substations.

Q. Will AIC connect its existing system to the Project?

A. Yes. As explained by ATXI witnesses Ms. Maureen A. Borkowski (ATXI Ex. 10.0) and, from a planning perspective, Mr. Kramer and by MISO witness Mr. Jeffrey R. Webb, AIC, as a Midwest Independent Transmission System Operator ("MISO") transmission owner, is obligated to construct approved projects in its area. The answer also is "yes" from an operations perspective. As Director of Transmission Operations for AMS, I oversee the transmission system functions, including the design, procurement, construction and project management of new facilities, for all Ameren Operating Companies, including ATXI and AIC. AMS personnel under my supervision have already engaged in conceptual planning for, and the preliminary design of, potential connections Mr. Rockrohr is concerned may not be made. As I explained in my direct testimony, however, final planning and design for the connections depends on the route, including substation locations, approved in this docket. Mr. Rockrohr's recommendations regarding that route are evidence of this. He recommends that the Commission approve portions of the Project's route that are different than those originally proposed by ATXI. He also questions the need for and location of certain substations ATXI has proposed as part of the

Project. Should the Commission approve the Project route and facilities as Mr. Rockrohr recommends, the Project as approved will be different from the Project as proposed. That may necessitate additional connection locations, moot others, and otherwise alter the locations of the connections initially anticipated. Once the final route for the Project is known, however, final routing, locations, and alignment for the Project will be known and will be used to establish viable, reliable, cost-effective routes for any 138 kV relocations or extensions needed. Thus, at the time of the final order in this docket, AIC will be in a position to define the precise connections to its system, and will seek Commission approval of connections if necessary.

Mr. Rockrohr acknowledged in discovery he "understands that the routing and cost of ATXI's 345 kV transmission line and the routing and cost of any AIC 138 kV connections to that 345 kV transmission line depend upon the location of ATXI's substation sites." (ATXI-ICC 1.02.) He also explained the Commission need not consider the possible routing of all potential 138 kV transmission lines that might connect to an applicant's proposed transmission facilities. (ATXI Ex. 12.1, p. 5 (ATXI-ICC 2.17).) He apparently recognizes the connections cannot be determined until the Project route, including the location of substations, is finalized. Nevertheless, he contends the Project should not be approved without the connections finalized. Thus, the position he takes essentially creates a Catch 22 for ATXI.

Q. Mr. Rockrohr finds it "perplexing" that the connections are excluded from the Certificate ATXI is requesting when the connection costs are part of the MISO Multi Value Project and are included in the Project cost estimates. Can you explain?

A. Yes. The costs of the connections are *de minimis* relative to the total projected cost of the Project. They were included in the Project cost for completeness, because the connections are needed (and, as discussed above and by Ms. Borkowski and Mr. Kramer, will be made).

B. Section 8-406.1 Requirements

Q. Section 8-406.1 requires that the Commission grant a CPCN if it finds, among other things, that the public utility is capable of efficiently managing and supervising the construction process of a transmission line project. 220 ILCS 5/8-406.1(f)(2). Does Mr. Rockrohr believe ATXI is capable of efficiently managing and supervising the construction of the Project?

A. It's not clear. Mr. Rockrohr acknowledges ATXI will fully rely on AMS to provide all planning, design, and engineering for the Project, and he states he has no reason to question that AMS has successfully overseen the construction of other transmission line projects. (ICC Staff Ex. 1.0R, ll. 160-62.) He expresses "concern," however, regarding whether ATXI is capable of efficiently managing and supervising construction given that it "employs only one individual"—Ms. Borkowski. (*Id.*, ll. 162-63.)

Q. How do you respond to Mr. Rockrohr's "concern" in this regard?

A. Ms. Borkowski responds to Mr. Rockrohr's concern regarding ATXI's corporate structure. Apart from that, AMS is capable of efficiently managing and supervising construction of the Project for the reasons I discussed at length in my direct testimony (ATXI Ex. 3.0 (2d

Rev.), ll. 60-117). I believe Mr. Rockrohr would agree with this. He does not take the position AMS personnel are not capable of managing or supervising the Project, and he is not aware of any Commission order in which the Commission found AMS unable to provide adequate management and supervision of transmission line construction. (ATXI Ex. 12.1, pp. 1-2 (ATXI-ICC 1.04, 1.05).) I see no reason why the Commission would find AMS incapable of overseeing the construction of this Project.

Q. Section 8-406.1 requires the Commission to grant a CPCN if it finds, among other things, that a proposed transmission line project is the "least cost means" of satisfying certain ratepayer benefits enumerated in the statute. 220 ILCS 5/8-406.1(f)(1). How does Mr. Rockrohr define "least cost" in this context?

A. Apparently, he interprets "least cost" to mean "least initial dollar cost." He states, in evaluating the proposed routes for the Project, that he attempted to identify the "least costly" route for each portion. He explains a route that follows a straight line is shorter, requires fewer facilities to maintain, and does not require expensive dead-end or angle structures. Accordingly, he explains, such a route is less costly than one that meanders. As such, he generally favored straight routes. (ICC Staff Ex. 1.0R, ll. 439-63.) Witnesses for certain intervening parties also contend the "least cost" route for a specific portion of the Project is the route that is the least dollar cost. (*See, e.g.*, STPL Ex. 3.0 (Mills Dir.), ll. 32-36; MSSCLPG Ex. 1.0 (Bergschneider Dir.), ll. 140-48.)

Q. Do you have any concerns regarding Mr. Rockrohr's apparent definition of "least cost?"

A. Yes. I am not an attorney. However, I do not agree with Mr. Rockrohr's seemingly narrow interpretation of "least cost" in Section 8-406.1. First, although Mr. Rockrohr acknowledges ongoing expenses are a consideration in determining least dollar cost (ICC Staff Ex. 1.0R, ll. 442-43), he limits his consideration to the reduced ongoing expense resulting from fewer facilities along a shorter route. This ignores ongoing expenses associated with maintenance and repair of the transmission facilities and vegetation management resulting from the line's proximity to environmental occurrences and manmade structures. It also ignores the very real cost to customers of reliability differences that are offered by route selection. And, of course, there are societal costs differences. As ACPO witness Ms. Karen S. Pedersen recognizes, "[p]lacing transmission lines through residential neighborhoods and the effect on the environment is always an important consideration." (Pedersen Dir. (ACPO), p. 5, ll. 20-21.) ATXI could have proposed, and is capable of constructing, a transmission line for the Project that crosses Illinois "as the crow flies" (from substation to substation)—that would be the straightest, shortest and, consequently, least initial dollar cost route. But such a line might not be the "least cost means" when considering the above factors. ATXI witness, Ms. Donell (Doni) Murphy (ATXI Ex. 13.0) further explains, from a routing perspective, why "least cost" does not always mean "least dollar cost."

C. Substation Site Locations

Q. What does Mr. Rockrohr generally conclude regarding the substation site locations ATXI has proposed for the nine substations along the Project routes?

A. Because he believes there is a lack of evidence AIC will connect to the proposed 345/138 kV transformers, he concludes the substations will not serve any useful purpose.

Q. How do you respond?

A. I disagree there is a lack of evidence AIC will not connect, for the reasons I discussed above. Further, the new substations are intended to terminate the Project circuits and connect them to the existing bulk electric system to provide improved reliability and transfer energy from the high-capacity circuits of the Project to 138 kV circuits. It is incorrect to suggest the new substations serve no purpose if they are not connected to the existing system because they would still function as sectionalizing (isolation) and/or "tap points." Sectionalizing is important in operations and maintenance because it allows a utility to limit the length of a circuit that will be taken out of service, through automatic means during fault conditions, as well as through manual switching during maintenance or repair. If you have a transmission line of 400 miles and do not provide sectionalizing, faults anywhere on the line will be isolated by the breakers at either end which removes all 400 miles from service. If an insulator is damaged and needs to be repaired, breakers and switches at both ends will need to be opened for workers' protection and all 400 miles will be out of service for that repair. As to tap points, there are locations in the Project, e.g., Meredosia, where the path from west to east includes a line extension in a different direction (Meredosia-Ipava). While it is possible that such a connection could be made with a solid connection to the main line (a "splice"), circuit breakers are planned to be installed for

isolation of the segments. If a fault where to occur on the Meredosia to Ipava portion of the Project without breakers, that portion, and the main line would all be outaged. With the circuit breakers installed and able to interrupt faults, only the Meredosia-Ipava section would be removed from service. Likewise, if the portion from Meredosia to Quincy were involved in a fault, circuit breakers would isolate that problem and allow flow to continue on the Meredosia-Ipava and Meredosia-Pawnee sections. So, the substations add value through this sectionalizing, and tap point, function. But importantly, they <u>are</u> part of the MISO MVP Portfolio, and they represent "drop-off" points identified through the RGOS and MVP studies as the preferred locations. As such, they are required to deliver the full benefits of the MVP portfolio, and will do so once the connections are made.

Q. What does Mr. Rockrohr otherwise conclude regarding ATXI's proposed substation site locations?

A. He believes the substation site locations ATXI has proposed at Quincy, Meredosia, Pawnee, and Pana are logical. He believes it would be more logical for ATXI to locate the proposed Mt. Zion substation further south than ATXI has proposed. Ms. Borkowski and Mr. Kramer respond to that recommendation. Finally, he believes, instead of ATXI building new substations at Ipava, Kansas, Sidney, and Rising, ATXI should connect the proposed transmission line to the existing AIC-owned substations near those locations.

Q. Do you agree with Mr. Rockrohr's recommendation the proposed transmission line should connect to existing AIC-owned substations at Ipava, Kansas, Sidney and Rising, rather than new substations at those locations?

A. No. It is impractical, if not impossible, for the necessary facility additions and connections to be made within the existing substations Mr. Rockrohr identifies. As explained in my direct testimony, ATXI determined that it was preferable to construct new substations, rather than modify the existing facilities, based on space requirements, engineering requirements (including, but not limited to, control cable length, station service design limiting bus crossing and circuit ingress and egress, topology), and potential future development needs of the existing substations.

Specifically, the new facilities that ATXI proposes to install are intended to accommodate: three string, three breaker per string, breaker-and-a-half 3000 A, 345 kV substation facilities to terminate the line segments of the Project, consisting of the following major equipment: nine (9)- 345kV breakers, twenty-four (24) 345kV motor-operated switches, and 345 kV bus conductor; also, a 345/138 kV, 560 MVA autotransformer and associated 138kV, 3000A, transformer low-side circuit breaker. The proposed configurations at Ipava, Kansas, Sidney and Rising require a much larger substation development than exists. Further, the existing substations at those sites did not have a 345 kV breaker or 345 kV bus, much less the 345 kV breaker-and-a-half positions required to terminate the Project's lines. Accordingly, the existing facilities are not sufficient to terminate those lines, and they offer the least reliable substation configuration with their straight bus configuration. The new substations,

as proposed by ATXI, are necessary and will address the limited capabilities of the existing AIC substations at Ipava, Kansas, Sidney, and Rising.

Q. Does Mr. Rockrohr have other comments regarding ATXI's proposed substations?

A. Yes. He identifies what he believes to be an inconsistency in ATXI's filing regarding whether ATXI plans to connect to AIC's existing substation at Kansas or whether it plans to construct a new substation adjacent to the existing AIC substation there, and he requests clarification. (ICC Staff Ex. 1.0R, ll. 913-20.)

Q. Please provide the clarification regarding the Kansas substation Mr. Rockrohr requests.

A. ATXI proposes to construct a new substation at Kansas, and it will be connected to AIC's existing facilities, for the reasons I discussed above.

V. RESPONSE TO ELECTROMAGNETIC FIELD TESTIMONY

Q. Are you familiar with Intervener testimony in this case relating to the effect of the proposed 345 kV line's electromagnetic field, or "EMF"?

A. Yes. Witnesses for intervening parties have expressed concern that the proposed 345 kV transmission line's EMF will have various negative impacts on certain wireless technologies they rely upon. For example, numerous witnesses testify the line's EMF will diminish the accuracy of farming technology and, specifically, GPS navigation systems on farming equipment, such as auto-steering and swath control technology. (*See, e.g.*, Flesner Dir. (ACPO), ll. 39-40; Loos Dir. (ACPO), ll. 63-66; Miller Dir. (ACPO), ll. 71-73; MSSCLPG Ex. 1.0 (Bergeschneider Dir.), ll. 89-91; MSSCLPG Ex. 2.0 (Rhea Dir.), ll. 80-81.) Mr. Kenneth K. Humphreys testifies on behalf

of Intervener FutureGen Alliance, Inc. ("FutureGen") that the performance of certain subsurface monitoring technologies utilized by FutureGen to account for the carbon dioxide it stores underground will be degraded by the line's EMF. (Humphreys Dir. (FutureGen), p. 2, ll. 18-21, p. 3, ll. 1-7.) N. Kohl Grocer witness, Mr. Richard M. Ehrhart testifies he is concerned about the impact of the line's EMF on cellular and wireless data reception in N. Kohl Grocer's nearby warehouse facilities as well the technology it uses to process orders. (Ehrhart Dir. (NKG), p. 6, ll. 16-22.) Mr. Lockwood testifies EMF will degrade his wireless Internet connection. (Lockwood Dir., Q. 7.)

Various Intervener witnesses also testify they are concerned the proposed line's EMF could impact nearby metal objects. JDL witnesses, Ms. Lori Spangler and Mr. Charles F. Ellis testify metal tools used by crews maintaining JDL's FM radio broadcast tower could arc if the line is routed near the tower. (JDL Exs. 1.0 (Spangler Dir.), ll. 239-41; 2.0 (Ellis Dir.), ll. 66-69.) Wiese Farms witness Mr. Loren Wiese, and STPL witness, Ms. Laura Te Grotenhuis also suggest the line will negatively affect nearby grain bins and other metal buildings. (Wiese Dir. (Wiese Farms), Ex. 1, Q. 5; STPL Ex. 2.0 (Te Grotenhuis Dir.), ll. 84-88.)

Finally, a number of Intervener witnesses are concerned the line's EMF may negatively impact their health or that of their livestock. ATXI witness, Dr. Linda S. Erdreich (ATXI Ex. 17.0) explains EMF generally, and responds to those health-related concerns.

Q. Has ATXI calculated the EMF for the Project?

A. Yes. The electric field at the edge of the right-of-way for the structure types ATXI will use for the Project is less than 1 kV/m (kilovolt per meter). The magnetic field strength at the

edge of the right-of-way for the structures ATXI will use, at usage levels that are routinely expected for the line when it is in service, are less than 18mg (milligauss).

Q. How does the Project's EMF level compare to the EMF levels of typical household items?

A. At a distance of one foot, a blender at high speed typically generates a magnetic field of 20mg, some microwave ovens on the highest setting generate magnetic fields of 200mg, a hair dryer at the highest setting generates a magnetic field of 70mg, and a refrigerator typically generates a magnetic field of 20mg. Obviously, with different appliances, there are a range of values, but these can be considered representative.

Q. Can EMF affect nearby wireless technology or metallic objects?

A. Yes, large electric and magnetic fields, if they are not controlled, can affect nearby electrical devices and conductive objects. One of the best ways to control field strengths, however, is to increase the distance from the source.

Q. Is the proposed 345 kV transmission line's EMF a concern as it relates to wireless technology or metallic objects near the line?

A. No. The transmission line is designed to limit EMF levels for off-right-of-way devices. The conductors are stacked and offset, rather than placed in a horizontal configuration. The conductor heights are designed with sufficient height and the rights-of-way are 150 feet in width to allow the exponential effect of distance to mitigate the fields. And metallic objects will be grounded. AMS has routed transmission lines all over the state of Illinois and in other states, many miles of which cross actively farmed agricultural land. While EMF is a phenomena that

must be considered, practical steps mitigate adverse affects. Finally, I note AMS oversees the operation of many miles of 345kV transmission lines in service in many different settings, without ongoing issues in this regard.

VI. RESPONSE TO STRAY VOLTAGE TESTIMONY

Q. Are you familiar with testimony in this proceeding relating to the effect of "stray voltage" allegedly from ATXI's proposed 345 kV transmission line on livestock and farmers?

A. Yes. Several witnesses have testified they are concerned "stray voltage" from the transmission line will negatively affect livestock grazing near the line or farmers working near the line. (*See, e.g.*, Flesner Dir. (ACPO), ll. 44-47; Peters Dir. (ACPO), ll. 95-96, 101-02; Edwards Dir. (ACPO), ll. 68-70; STPL Ex. 2.0 (Te Grotenhuis Dir.), ll. 87-88.)

Q. Please explain what "stray voltage" is.

A. "Stray voltage" may refer to several different phenomena as used in common lexicon. However, the standard definition of stray voltage as proposed by the IEEE Working Group 1695 is "A voltage resulting from the normal delivery and/or use of electricity (usually smaller than 10 volts) that may be present between two conductive surfaces that can be simultaneously contacted by members of the general public and/or their animals. Stray voltage is caused by primary and/or secondary return current, and power system induced currents, as these currents flow through the impedance of the intended return pathway, its parallel conductive pathways, and conductive loops in close proximity to the power system. Stray voltage is not related to power system faults, and is generally not considered hazardous." This differs from other undesirable contact voltage issues that are often called "stray voltage." These latter phenomena are

associated with currents or voltages that are present under abnormal conditions, e.g., faults on the power system, improper grounding, or damaged equipment. As noted by Dr. Erdreich, stray voltage also is called "tingle voltage" or "contact current" because it is a small voltage—less than 10 Volts.

Q. Will the proposed 345 kV transmission line have stray voltage?

A. No. Stray voltage is most typically associated with single phase distribution where neutral currents flow on a neutral wire which is in contrast to three-phase circuits, especially transmission circuits, where neutral current is minimized, and in fact, zero when the three phases are balanced. Additionally, the project's transmission lines will be designed to ensure that stray voltage is not a problem. The line will connect to electrical substations at the ends, and not to any customers' electrical systems. The line will be effectively grounded. Also, the design of the project will ensure that normal current flows are not carried through other objects. Finally, during construction of the project, ATXI will ground metallic objects, if any, at the rights-of-way.

VII. RESPONSE TO NEARBY LIMESTONE MINING OPERATIONS TESTIMONY

Q. Are you familiar with testimony in this proceeding relating to the impact of the Project on nearby limestone mining operations?

A. Yes. Mr. Bush, on behalf of Intervener STPL (STPL Ex. 4.0 (Bush Dir.)), and Mr. Tarble, on behalf of Intervener Tarble Limestone Enterprises ("TLE") (Tarble Ex. 1.0 (Tarble Dir.)), raise concern regarding the proximity of the portion of ATXI's Primary Route between Kansas and Sugar Creek to limestone quarry operations in Clark County, Illinois.

Q. What do you understand Mr. Bush's first concern to be?

A. Mr. Bush opines "the continual presence of lime dust (arising from the operations of the stone quarry) will be and become a problem to the 345kV transmission line and its components . . ." (STPL Ex. 4.0, ll. 26-27.) He generally contends airborne lime dust from limestone mining operations can build up on the transmission line's insulators, causing system failures and facilities failures. (*Id.*, ll. 40-93.) He believes, therefore, that the continuous presence of lime dust will create a persistent maintenance problem, increasing the cost of line maintenance and operation, and shortening the useful life of the transmission facilities. From this he concludes the Primary Route between Kansas and Sugar Creek is not the "least cost" route as required by Section 8-406.1. (*Id.*, ll. 99-108.)

Q. Do you agree with Mr. Bush's concern regarding the presence of lime dust near the proposed transmission line?

A. No. Based on AMS's experience constructing, operating and maintaining electrical facilities proximate to limestone quarries, the concerns raised by Mr. Bush are unfounded. AMS has overseen the construction of, and oversees the maintenance and operation of, transmission lines located adjacent to quarry operations in several locations, for example, near Troy, Missouri. Yet, AMS has not experienced the transmission line operational or maintenance problems associated with lime dust Mr. Bush describes. I would also point out Mr. Bush has not performed any studies or analyses concerning the effects of lime dust on electric transmission lines. (ATXI Ex. 12.1, p. 23 (ATXI-STPL 2.28).) At this point, his opinions are unsupported conjecture.

Q. Do you have any particular expertise in this area?

A. Yes. While in college doing Masters-level course work, I conducted several experiments on insulation contamination. In 1986, I was responsible for a research and development project involving insulation contamination on transmission facilities that was instigated by a flashover on transmission insulators. I authored and co-authored four papers on the findings from that project and presented the same at technical conferences and meetings. Also, as part of the remediation efforts, I designed a special style of insulator that was used for remediation in that instance.

Q. If the transmission line's insulators become contaminated, can this be remedied?

A. Yes, although, as stated, this is not expected to happen. If a structure were to experience degraded operation, insulators can be changed out to different materials or different designs, and coatings can be applied to improve performance.

Q. How do you respond to Mr. Bush's contention the continuous presence of limestone dust near the Primary Route of the transmission line between Kansas and Sugar Creek will increase line maintenance and operation costs, thereby making that portion of the Primary Route not the "least cost" route?

A. His contention reflects a fundamental misunderstanding of the transmission line planning and routing process. The projected routes selected for the Project take into account the expected maintenance and operations costs, including increased costs resulting from the location of any portion of the line, if appropriate. Mr. Bush has not prepared any cost study or analysis that supports his opinion the cost of lines operations and maintenance for the Project will be increased by the continual presence of lime dust, and he has no knowledge or evidence the

projected costs for the Primary Route do not include increased costs for line operations and maintenance due to the proximity to quarry operations. (ATXI Ex. 12.1, pp. 24-25 (ATXI-STPL 3.03, 3.04).)

Q. What do you conclude regarding Mr. Bush's concern relating to the presence of limestone dust from quarry operations in proximity to ATXI's Primary Route?

A. I believe it is a nonissue, for the reasons I discussed above. Also, despite his claimed expertise, Mr. Bush is not aware of any laws, rules, regulations or industry standards pertaining to the proximity of limestone mining operations to a property line. (ATXI Ex. 12.1, p. 26 (ATXI-STPL 3.08).) I note, however, Mr. Tarble is. He identified 62 Ill. Adm. Code 300.110(h) as regulating the proximity of limestone mining operations near a property line. (ATXI-TLE 3.03.) I am not an attorney, but I read that rule to generally preclude mining operations closer than 10 feet plus 1 ½ times the depth of the excavation, absent exceptions, from a property line. According to Mr. Tarble, this setback regulation means Charleston Stone Company, for instance, cannot mine closer than 107.5 feet from its boundary line. (ATXI-TLE 2.16.) This distance would seem to reduce, if not alleviate altogether, the presence of lime dust near the transmission line.

Q. What do you understand Mr. Bush's next concern to be?

A. He next opines, "the necessary blasting attendant to the operations of the stone quarry will also be and become a problem to the 345kV transmission line and its components." (STPL Ex. 4.0, ll. 28-29.) He contends blasting causes vibrations in the transmission line facilities which leads to "grooving," the back and forth motion of the transmission line conductors. He explains this can cause certain mechanical failures in the line. Mr. Bush also contends the

blasting associated with mining operations can cause "shot rock" from the quarry to strike the transmission facilities, again resulting in certain mechanical failures. He opines the Kansas to Sugar Creek portion of the Primary Route's proximity to a stone quarry will increase the cost of line operations and maintenance, requiring more frequent repair or replacement. As such, he again concludes that portion is not "least cost" per Section 8-406.1. (*Id.*, ll. 114-32.)

Q. Does Mr. Tarble raise similar concerns?

A. Somewhat, but he speaks to the impact of the transmission line on limestone mining operations. He contends Tarble will have to put in place costly measures to prevent "flyrock" from its mining operations from travelling a significant distance in order to avoid potential damage to the nearby transmission line. As such, he contends Tarble will have increased business costs. (Tarble Ex. 1.0, ll. 142-59.)

Q. How do you respond to this "blasting" concern?

A. I believe it also is a nonissue. AMS operates transmission or distribution lines next to quarry operations. It has never found "shot rock" or "flyrock" from blasting operations to be an issue. Moreover, Mr. Bush testifies that Primary Route runs along the southern boundary of Quality Lime Company's quarry site. (STPL Ex. 4.0, ll. 23-25.) I question how close to a quarry's property line the mining operator can permissibly blast, without impacting the rights of adjacent landowners. In response to discovery, Mr. Tarble identified 62 Ill. Adm. Code 300.225(d)(1) as applying to the proximity of the blasting attendant to quarry operations to a property line. (ATXI-TLE 3.04.) (Mr. Bush, for his part, is not aware of any applicable standards. (ATXI Ex. 12.1, p. 27 (ATXI-STPL 3.09).)) Again, I am not an attorney, but I read Rule 300.225 to prohibit "flyrock" from being cast beyond the mine operator's blasting zone and

to prohibit blasting which causes damage to property outside the blasting zone. Thus, it does not seem appropriate for any quarry operator to cause rock to project onto adjacent land, including the easement for the transmission line.

VIII. RESPONSE TO TESTIMONY REGARDING THE PROJECT'S CONSTRUCTION SCHEDULE

Q. Are you familiar with testimony in this proceeding regarding the construction schedule for the Project?

A. Yes. A number of witnesses have raised concern the timing of construction of the Project may interfere with other construction processes or their use of their land. For instance, Mr. Ehrhart (Ehrhart Dir. (NKG), p. 6, ll. 8-12) implies construction will interfere with N. Kohl Grocer's warehouse construction process. Mr. Humphreys on behalf of FutureGen raises concern regarding overlapping construction schedules for the Project and FutureGen's pipeline project. (Humphreys Dir. (FutureGen), p. 2, ll. 11-13). Other Intervener witnesses raise concern construction will impact their use of the property, such as farming or hunting or other recreational use. (*See, e.g.*, Alex House Dir. (ACPO), ll. 71-72, 74-75.)

Q. How do you respond?

A. It is always necessary to coordinate with property owners, road commissioners and other ongoing construction processes during the construction of transmission line projects. This Project will be no exception. Accordingly, ATXI would coordinate with other construction processes. Also, ATXI will follow all codes, standards, and regulatory requirements in the construction and operation of the Project.

IX. RESPONSE TO ONGOING MAINTENANCE AND REPAIR TESTIMONY

Q. Are you familiar with testimony in this proceeding relating to the ongoing maintenance and repair that will be necessary once the Project is constructed?

A. Yes. Witnesses for various Interveners allude to the impact on their property interests they believe will result from maintenance and repair of the Project facilities after their construction. (*See, e.g.* Tarble Ex. 1.0, l. 66; Ragheb Family Ex. 1.0, ll. 300-03, 326-27, 329.)

Q. How do you respond to those concerns?

A. Maintenance and repair of transmission lines after construction is noninvasive. Generally, maintenance consists of an individual utility line worker walking in the transmission line easement twice a year for inspection. Repair also is limited to the easement owned by the utility and, while it does occur, it is not a regular event. As such, there should be no concern that, post construction, the maintenance and repair of the Project facilities will be a nuisance.

X. RESPONSE TO STPL WITNESS, MR. BAIRD

Q. STPL witness Mr. Baird contends ATXI's Primary Route in Clark County would transect a federally owned floodplain easement. (STPL Ex. 1.0 (Baird Dir.), ll. 164-65.) Are you familiar with the easement he references?

A. Yes.

Q. Can ATXI construct the Primary Route in Clark County without transecting the easement?

A. Yes. ATXI can construct the Primary Route without crossing the land touched by the floodplain easement. As discussed in Ms. Murphy's testimony, ATXI can make a slight adjustment to the Primary Route to avoid the easement entirely.

Q. Can ATXI construct the Primary Route so that the lines do not impact the easement area?

A. Yes. It also is possible to construct the transmission line so that no structures are placed within the floodplain easement area, and to design the line so the lowest point of sag is 100 feet or higher, which is taller than any tree. Therefore, there would be no interference with vegetative cover, floodplain protection, or runoff and erosion control. The only impact to the easement property would be overhanging wires.

Q. Can you address the cost considerations relevant to crossing or avoiding the floodplain easement?

A. The cost for this segment is not expected to differ significantly whether the route transects the easement or goes around it. While the transection option is shorter, it involves taller structures and their incumbent higher cost for structure and foundation. Ultimately, the cost difference for this small piece would come down to the soil capability, which is not known at this time. But any difference is not significant to the segment cost.

XI. RESPONSE TO JDL WITNESSES, MS. SPANGLER AND MR. ELLIS

Q. Have you reviewed the testimony of Ms. Spangler and Mr. Ellis submitted on behalf of JDL (JDL Exs. 1.0 (Spangler Dir.), 2.0 (Ellis Dir.))?

A. Yes. Generally, they raise concern regarding the proximity of the Primary Route to JDL's FM radio broadcast tower ("JDL Tower") and related facilities located in Martinsville, Illinois. They contend the JDL Tower is located 220 feet from the centerline of the easement for the Primary Route, and that parts of one of the tower's guy wires and related guy anchor and part of the fence surrounding the JDL Tower are within the easement.

Q. Ms. Spangler states, "[a]ccording to the Illinois Rivers Transmission Project website there may no be structures within the easement." (JDL Ex. 1.0 (Spangler Dir.), ll. 72-73.) Is that right?

A. Not exactly. The website states that structures may not be built in the easement. Ms. Spangler agrees the exact working on the website states "Property owners will retain full use of the property within the easement, though structures may not be built or trees planted within the easement." (ATXI Ex. 12.1, p. 6 (ATXI-JDL 3.05.) In fact, once ATXI owns the easement, only it can build within it. That does not mean all pre-existing structures, such as the JDL Tower's guy wire and fence, cannot remain in the easement.

Q. Can you explain why some pre-existing structures may remain in the easement?

A. Yes. Perhaps a reference to vegetation might help explain how encroachments are considered for permitted use. AMS takes a "zoned" approach to managing vegetation both under and to the sides of high voltage transmission wires along transmission rights-of-way. The zone directly beneath and 20 feet beyond the wires is called the "wire zone." It is managed to encourage low growing plant species with a mature height of 10 feet or less. The "border zone," when present, is an area from the wire zone to the edge of a maintained right-of-way or easement. In general, this area is limited to plant species that have a mature height of less than 20 feet. In JDL's case, the easement encroachments, like permissible vegetation, are less than 10 feet tall and encroach only slightly.

Q. Is the presence of a guy wire in the easement a concern in any event?

A. No. The presence of a guy wire in the easement is not a concern for the transmission line or the radio station once it is properly grounded. Fences and other conductive objects are often located within a transmission easement.

Q. Both Ms. Spangler and Mr. Ellis raise concern about the proximity of the Primary Route to the JDL Tower given that the tower is 500-feet tall. They contend extreme weather or an aviation-related accident could cause the JDL Tower to collapse on a transmission line pole, or a transmission line pole to fall on the JDL Tower, with disastrous consequences. (JDL Exs. 1.0, ll. 212-24; 2.0, ll. 63-65.) How do you respond?

A. Ms. Spangler and Mr. Ellis' concern in this regard is hyperbolic and made without regard to pole placement. Tall trees can fall on the transmission line, and projectiles resulting from tornados can strike the line. Planes can hit the line. For these reasons, paralleling transmission lines is not desirable, as I explain above. Ms. Spangler and Ms. Ellis are conjuring up worse case scenarios without considering their likelihood. A meteor could strike the tower. That would be disastrous. But the cost to construct a radio broadcast tower or a transmission line support pole that is meteor-resistant far outweighs the likelihood either will be struck by a meteor. Ultimately, the risk that one of the events identified by Ms. Spangler or Mr. Ellis will cause either the JDL Tower to collapse or a transmission line pole to fall is quite small, and is outweighed by other routing considerations such as cost. Ms. Spangler and Mr. Ellis concede the likelihood of the tower's collapse is small: the JDL Tower has never collapsed, they do not expect it to collapse, and they agree the tower could collapse whether or not the Project is constructed. (ATXI Ex. 12.1, pp. 7, 11, 16, 20 (ATXI-JDL 3.26, 3.31, 4.19, 4.26).) Both Mr.

Ellis and Ms. Spangler also recognize there are a number of structures, and an actively farmed Christmas Tree farm within a 500-foot radius of the tower, and that, if the tower collapsed on those structures, there would be damage. (*Id*., pp. 8-10, 17-19 (ATXI-JDL 3.27, 3.28, 3.29, 4.23, 4.24, 4.25).) Regardless, because transmission lines can experience outages from various causes, both the planning and operation take such events into account. The collapse of the JDL tower is just one such risk.

Q. Mr. Ellis also opines, "[a]ny arcing or corona discharge in the transmission line at its proposed location approximately 220 feet from the [JDL] Tower very likely will cause radio transmission interference, and disrupt WMMC's broadcast signal." (JDL Ex. 2.0, ll. 87-89.) Ms. Spangler shares his concern (JDL Ex. 1.0, ll. 252-57.) Do you agree?

A. No. I note Mr. Ellis has not conducted any empirical studies or analyses to support his contentions in this regard. (ATXI Ex. 12.1, p. 21 (ATXI-JDL 4.57).) His contentions are misplaced in any event. Electronic equipment is routinely subject to interference and manufacturers shield for that occurrence. Also, as I discussed earlier, distance will mitigate the effects. I am not aware of any complaints received in at least the last 10 years from an entity operating as a radio station regarding alleged interference with radio signals resulting from a transmission line owned or operated by ATXI or any of its affiliates in Illinois. I also am not aware of any informal ICC complaints regarding alleged interference with radio signals resulting from a transmission line owned or operated by ATXI or any of its affiliates in Illinois being filed in 2009 -2012.

765 **Q. Is there a distinction to be made here between AM radio signals and FM radio**
766 **signals?**
767 **A.** Yes. Both Ms. Spangler and Mr. Ellis state the JDL Tower broadcasts FM radio signals.
768 The transmission line will not cause interference with the JDL Tower's FM signal. But AM
769 signals are sometimes affected by electric fields that affect the strength of the signal. AM signals
770 send information based on how strong the signal is. Anything that alters that affect the quality of
771 information transmitted. In contrast, FM signals transmit information based on the frequency of
772 the signal that is sent, which is not a function of signal strength.

773 **Q. Mr. Ellis states it is not uncommon for transmission lines of this size to have worn**
774 **insulation, loose bolts or cracked or chipped insulators maintenance issues, which can**
775 **cause arcing or corona discharge in the line. (JDL Ex. 2.0 , ll. 77-83.) Do you agree?**
776 **A.** No. Corona discharge is an electrical discharge in a fluid, usually air, that originates
777 from an energized conductor, that results from the ionization of the fluid to create a conductive
778 region which stops short of breakdown. While line damage can temporarily create an increase in
779 corona, it is hardly common, and readily mitigated when the repair is completed. As discussed
780 by Mr. Murbarger (ATXI Ex. 16.0), such damage is unlikely, in any event. I also note Mr. Ellis
781 appears to have no experience related to electric transmission lines, and his contention here
782 makes this evident. (ATXI Ex. 12.1, pp. 12-15 (ATXI-JDL 4.04, 4.05, 4.07, 4.08).)

783

Q. Mr. Ellis also contends the Project's EMF will induce voltages and current in the tower, guy wires, anchors and transmitter building, and could cause arcing and advanced deterioration of the tower, FM coaxial cable, fittings, and anchors. (JDL Ex. 2.0, ll. 101-02, 111-12.) Is he correct?

A. No. As I explained above relating to the transmission line's EMF, an electric field will be present, but it is mitigated by proper grounding for conductive surfaces. As stated, electromagnetic fields are present from everything electrical, including the electric service to the radio station.

Q. Mr. Ellis opines "[i]t is possible, depending upon the placement of the proposed 345 kV power line support structures, that the structures could block the microwave path between the studio and the transmitter station." (JDL Ex. 2.0, ll. 115-18.) Is he correct?

A. No. Ms. Spangler explains JDL uses a studio tower link to send WMMC's signal from Marshal to Martinsville, where it is broadcast across WMMC's listening area. The signal would have to cross the Primary Route. (JDL Ex. 1.0, ll. 246-51.) As Mr. Ellis recognizes, this "is unlikely, because the microwave signal should be able to flow around a limited physical impediment . . . ." (JDL Ex. 2.0, ll. 115-18.) I agree with this latter statement. It is unlikely that the structure will be located to perfectly block the path even if no consideration was made, and ATXI can adjust the tower location to ensure this does not occur.

XII. RESPONSE TO THE RAGHEB FAMILY WITNESS, DR. RAGHEB

Q. Are you familiar with the testimony filed by Dr. Ragheb on behalf of the Ragheb Family in this proceeding (Ragheb Family Ex. 1.0 (Ragheb Dir.))?

A. Yes. Generally, Dr. Ragheb takes issue with nearly every aspect of the Project and ATXI's filing, and he expresses a preference for what he believes are "competing" transmission line projects in the State. I respond to Dr. Ragheb's construction and operations related testimony.

Q. Dr. Ragheb contends the Project design ignores the possibility of "undergrounding" the power lines in certain areas. (Ragheb Family Ex. 1.0, ll. 128-30.) Do you understand what he means by "undergrounding" the transmission line?

A. I believe so. I think Dr. Ragheb assumes that ATXI did not consider a 345 kV underground cable.

Q. What is the cost of "undergrounding" transmission lines, and how does it compare to the estimated cost of the overhead circuits proposed for the Project?

A. Typically, for the same current carrying capacity, the cost is 10-20 times greater for underground versus overhead circuits.

Q. What does construction of "undergrounded" transmission lines entail generally, and how does it compare to the anticipated construction processes for the overhead circuits proposed for the Project?

A. For high capacity circuits like the Project, the typical construction requires the installation of a conduit system to contain underground conductors. This requires significant

construction activity on every foot that the line traverses since the underground circuit cannot "span" any ground.

Q. Why is "undergrounding" not a desirable option in transmission planning?

A. For the Ameren system, the economic and operating impacts do not favor underground transmission. Typically, underground transmission is limited to compact urban environments. Underground offers many challenges in operation, maintenance, and reliability implications because repairs take much longer than overhead repairs.

Q. Dr. Ragheb recommends that ATXI perform an analysis of undergrounding the existing transmission line in Champaign County. (Ragheb Family Ex. 1.0, ll. 420-24.) Did ATXI consider "undergrounding" the Sidney to Rising portion of the Project?

A. For the reasons discussed above—costs, reliability, and operation and maintenance concerns—underground transmission is not a viable option in this case. MISO evaluated the means of meeting the goals of its MVP portfolio, and, as a result of its system studies, it determined the best option was use of an overhead circuit.

XIII. RESPONSE TO N. KOHL GROCER WITNESS, MR. EHRHART

Q. Are you familiar with the testimony filed by Mr. Ehrhart on behalf of N. Kohl Grocer in this proceeding?

A. Yes. Mr. Ehrhart testifies N. Kohl Grocer has purchased property in Quincy, Illinois with the intention of developing that property for its expanded grocery distribution operations. Mr. Ehrhart testifies, if constructed, ATXI's Primary Route will bisect that property. (Ehrhart Dir., p. 3, ll. 5-8.) I would note that, pursuant to a stipulation with N. Kohl Grocer, N. Kohl Grocer and ATXI are advocating a route that would not cross N. Kohl Grocer's property.

Q. Mr. Ehrhart states it will be "impossible" for N. Kohl Grocer to operate the warehouse facility it intends to construct at the property "with a 345 kV transmission line running directly through the heart the property." (Ehrhart Dir., p. 6, ll. 5-7.) Do you agree?

A. No. ATXI could construct the Project over, or around, any obstructions that N. Kohl Grocer has planned for on the property. There are many warehouse operations in industrial settings with transmission facilities nearby, and, in a few cases, that overhang.

Q. Are you familiar with the alternate routes N. Kohl Grocer has proposed in this proceeding?

A. Yes. However, I note that pursuant to the stipulation with N. Kohl Grocer, they have been withdrawn.

Q. Regarding N. Kohl Grocer's second alternate route, which runs along an existing AIC 161/138 kV transmission line right-of-way, Mr. Ehrhart "assumes that new double circuit towers would be safer and more secure against wind loads than the existing wooden poles." (Ehrhart Dir., p. 14, ll. 3-4.) Do you agree?

A. Not necessarily. All Ameren transmission lines are constructed to NESC and other codes, as well as good utility practice.

Q. Mr. Ehrhart next contends N. Kohl Grocer's second proposed alternate route "would require the clearance of an existing right-of-way path so that annual maintenance expense should be less." (Ehrhart Dir., p. 14, ll. 4-6.) Do you agree?

A. Not necessarily. As I indicated earlier in the discussion of parallel and double circuit rights-of-way, there is no guarantee that the right-of-way would be less. And the greatest annual maintenance expense is vegetation management. If a new circuit traverses plowed fields, there is very little if any maintenance. And as mentioned before, if circuits are close together, expenses can be higher. And it is worth noting that the N. Kohl Grocer route as proposed would require crossing the existing line in at least two locations. These crossings introduce the reliability risks associated with one or more of the following: common structure, shield wire failure affecting lower conductors, conductor or insulator failure resulting in conductor vertical displacement, and external common-mode failure events.

Q. Mr. Ehrhart also contends, "the existing right-of-way paths and transmission lines have been in existence for 30-40 years. Modification of these lines from a wooden pole to double circuit monopole towers should reduce the impact on the public." (Ehrhart Dir., p. 14, ll. 6-8.) Do you agree?

A. Not necessarily. Double circuit structures are much taller and larger than individual circuit structures. It is possible that two smaller structures would be screened whereas a taller structure will be seen readily. Also, his contention overlooks the reliability impact on the public of the construction he proposes.

Q. Finally, Mr. Ehrhart opines, "having two circuits on this route with the very substantial foundations and heavy duty steel structures proposed should reduce concerns for wind damage outages and falling tree or falling limb damage outages, thus increasing reliability." (Ehrhart Dir., p. 14, ll. 8-11.) Do you agree?

A. No. As mentioned earlier, the structures are designed with the same design parameters.

XIV. CONCLUSION

Q. Does this conclude your revised rebuttal testimony?

A. Yes, it does.